



NCNR Hood Monitor

Monitoring Fume Hood Contamination Levels

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August 7, 2014

Background

▶ NCNR Reactor

- Radioactive samples common
- Samples require cautious handling

▶ Health Physics

- Concerned with radiological safety
- Provide protocol training
- Primary user of Hood Monitor

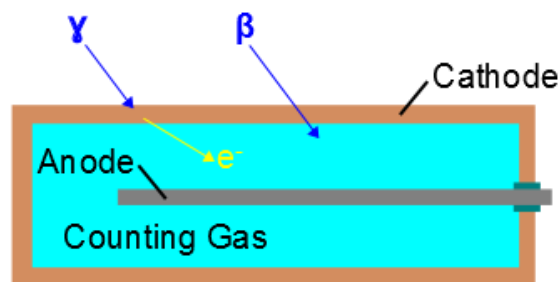
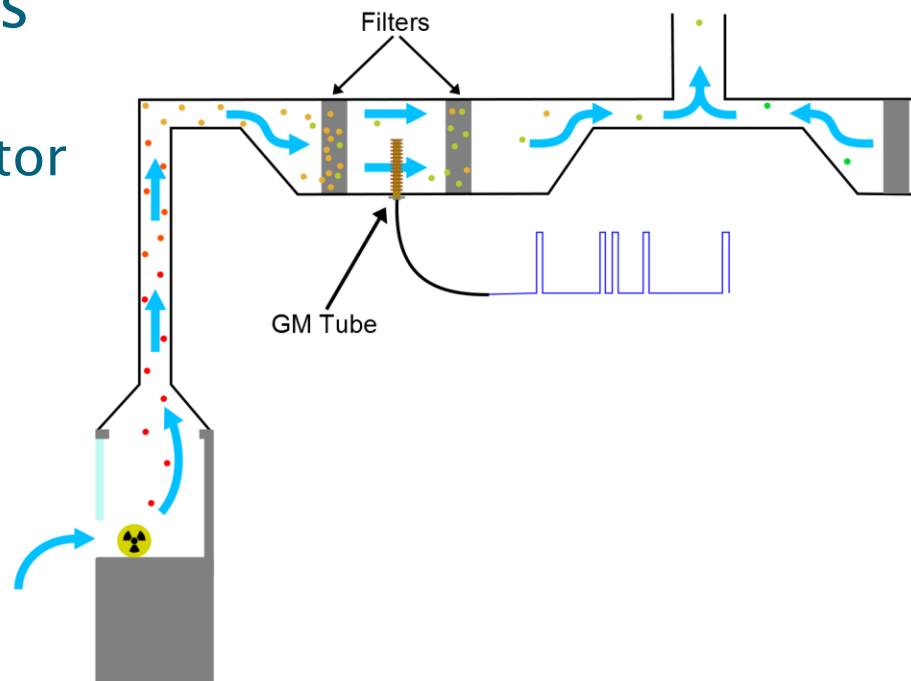
Fume Hoods

- ▶ Used when handling hazardous materials
 - Solids
 - Liquids
 - Contamination
- ▶ Maintains low interior pressure
 - Particles/fumes carried upwards
 - Away from hood user



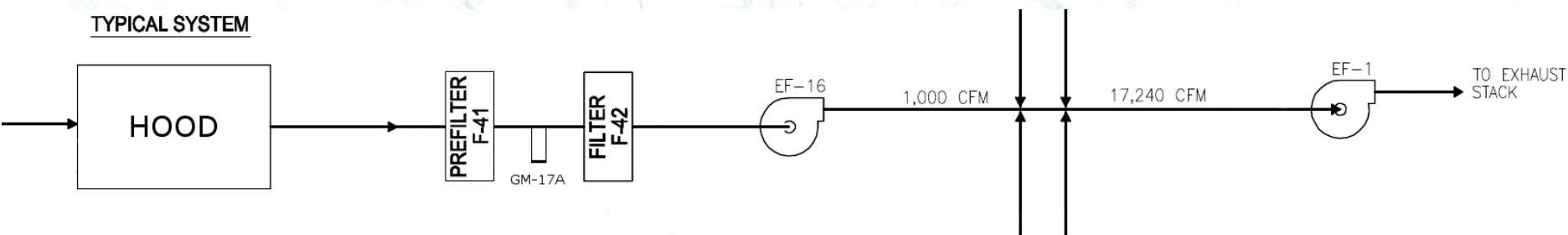
Detector Functionality

- ▶ Positioned between filters
 - Particulates trapped
 - Decay in proximity of detector
- ▶ Geiger-Müller Tube
 - Gamma and Beta
 - No energy measurement



Function

TYPICAL SYSTEM



- ▶ Quantified data
 - Current values
 - Comparative
 - Displays trends
- ▶ Identify contamination source
- ▶ Early warning

Sources of Contamination in Hoods

- ▶ 27 NCNR Fume Hoods in System
- ▶ Warm Labs (B-Wing)
 - Radiochemistry
- ▶ “Rabbit” Labs (C001 / C002)
 - Series of pipes leading into reactor core
 - Pneumatically inserts small samples
 - Returns irradiated samples to fume hoods



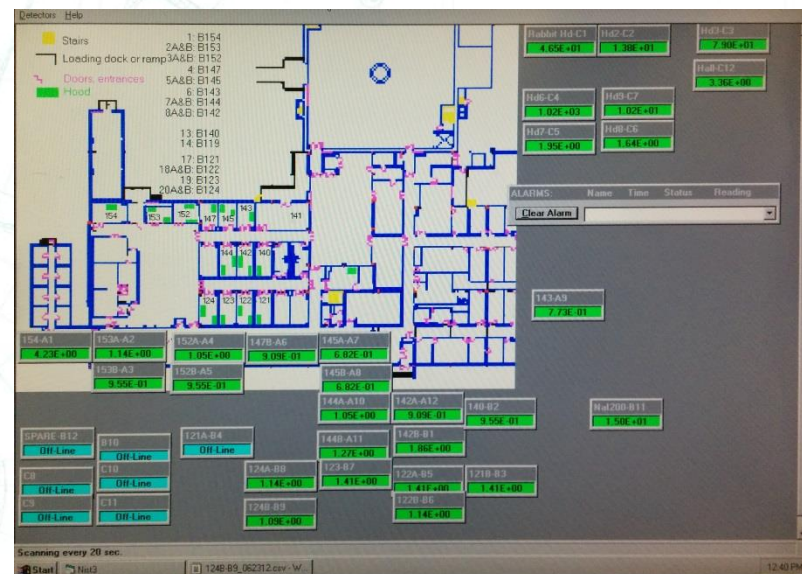
Current System and Scope

► Current System in Place

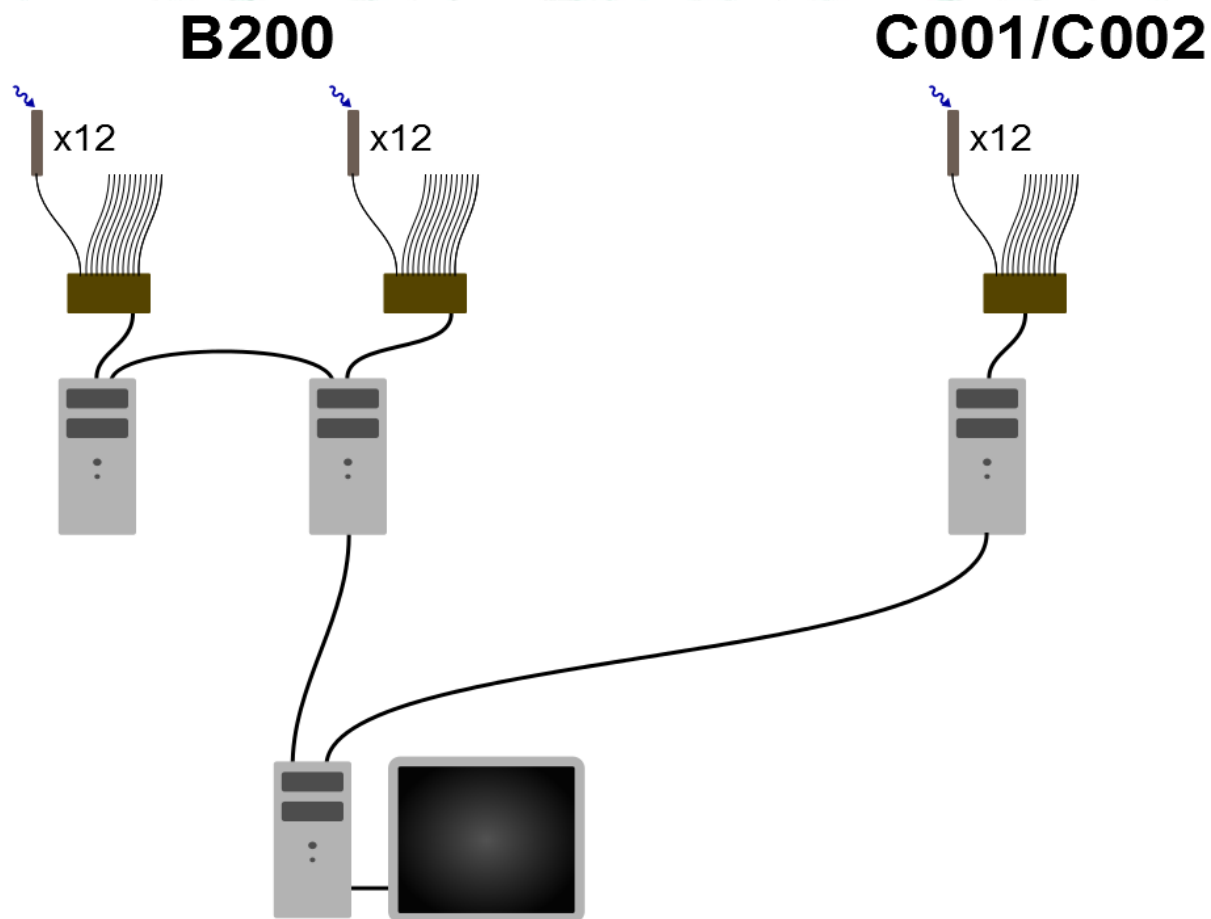
- Installed in 1997
- Running MS DOS and NT
- Single user-interface

► Scope

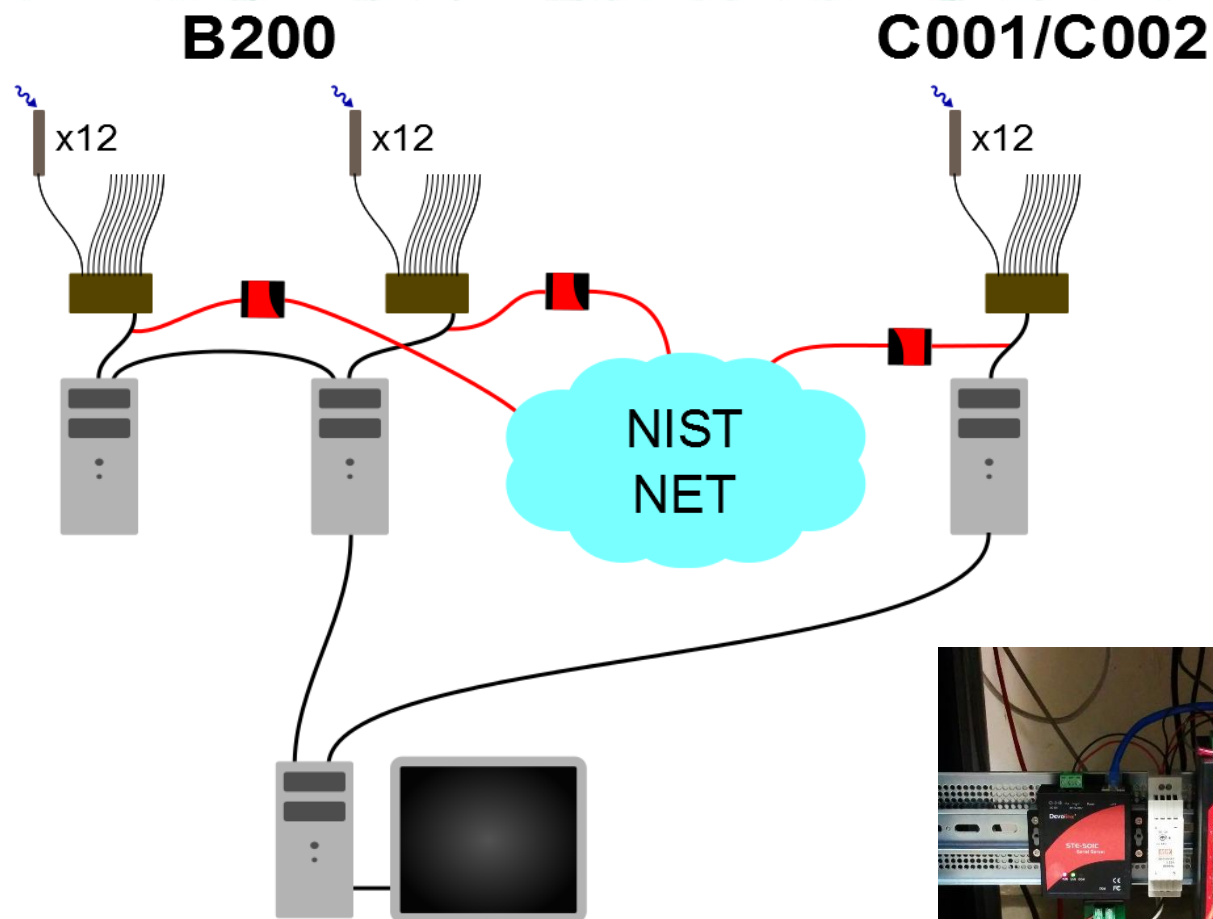
- Retain original detectors
- Replace computers with Virtual Server
- Replace UI with C#.NET program
- Improve accessibility



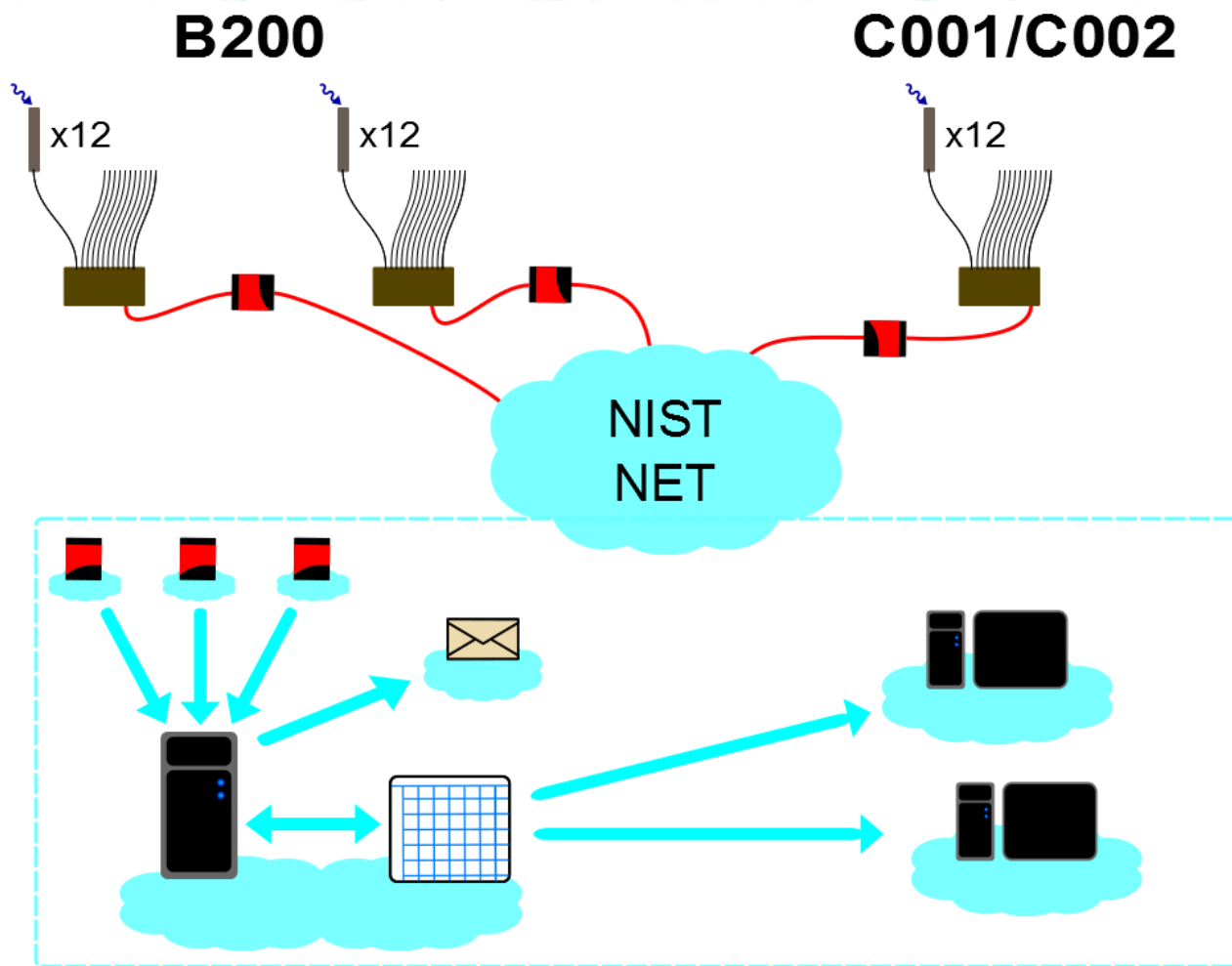
Current System Only



Combined System

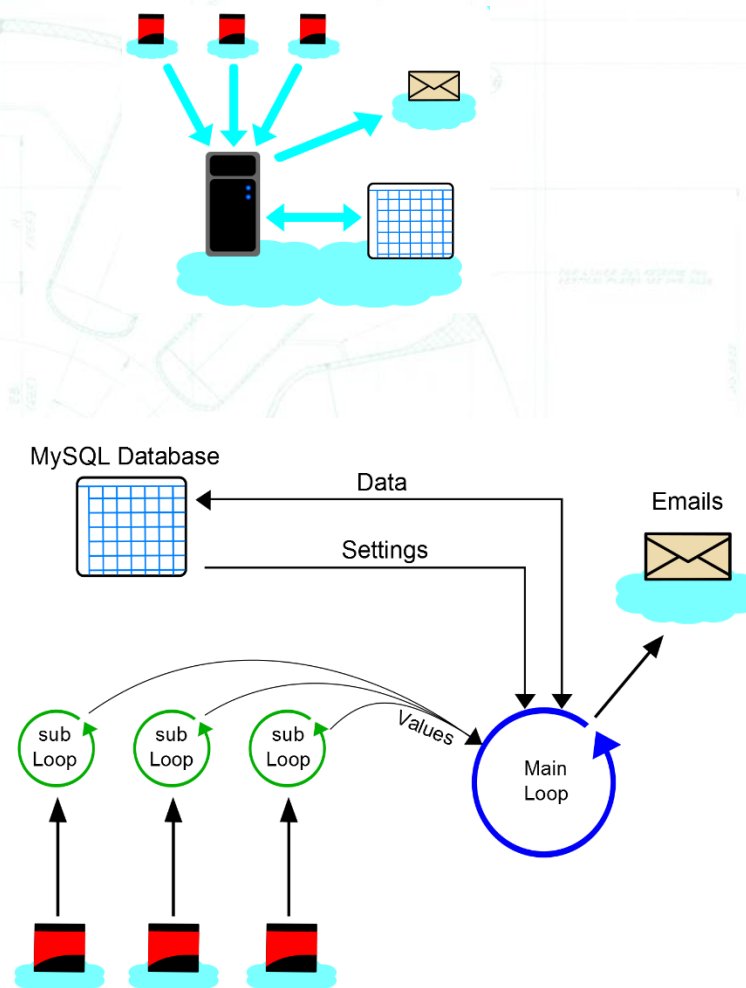


Virtual Components



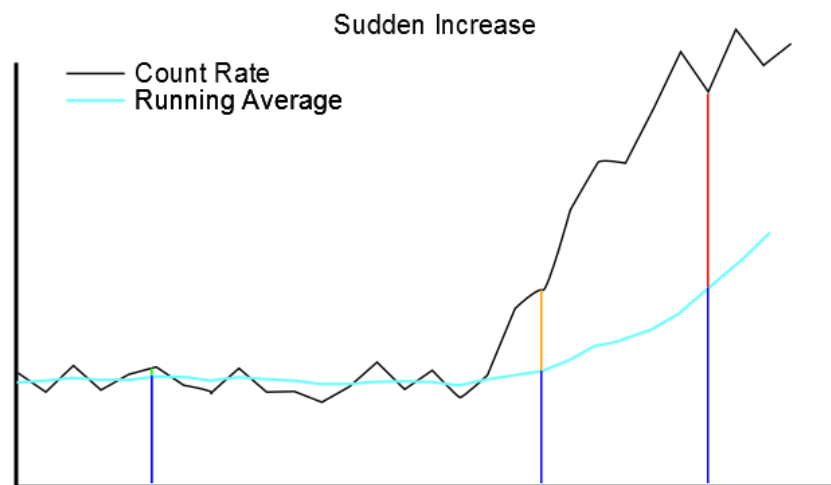
Virtual Server

- ▶ Red Hat Linux VM
- ▶ MySQL Database
 - Store values
 - Store alarm parameters
- ▶ Python Script
 - Retrieve values
 - Write to database
 - Retrieve alarm settings
 - Perform trend analysis
 - Generate emails

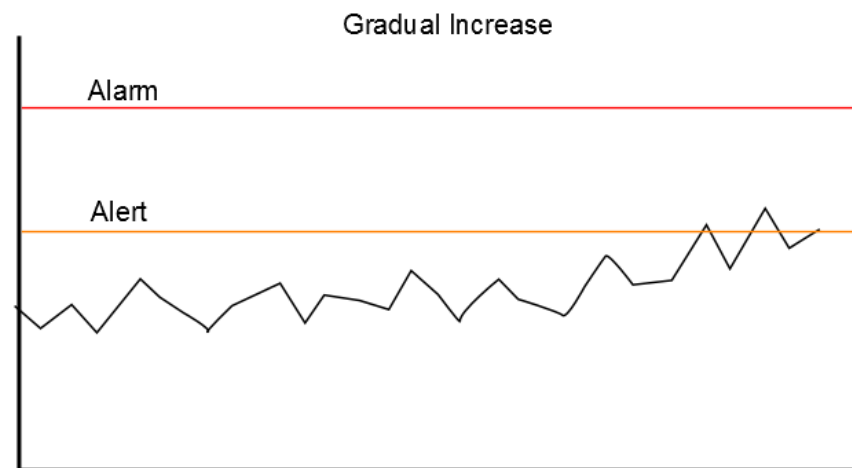


Alarm Functions

► Sudden Increase



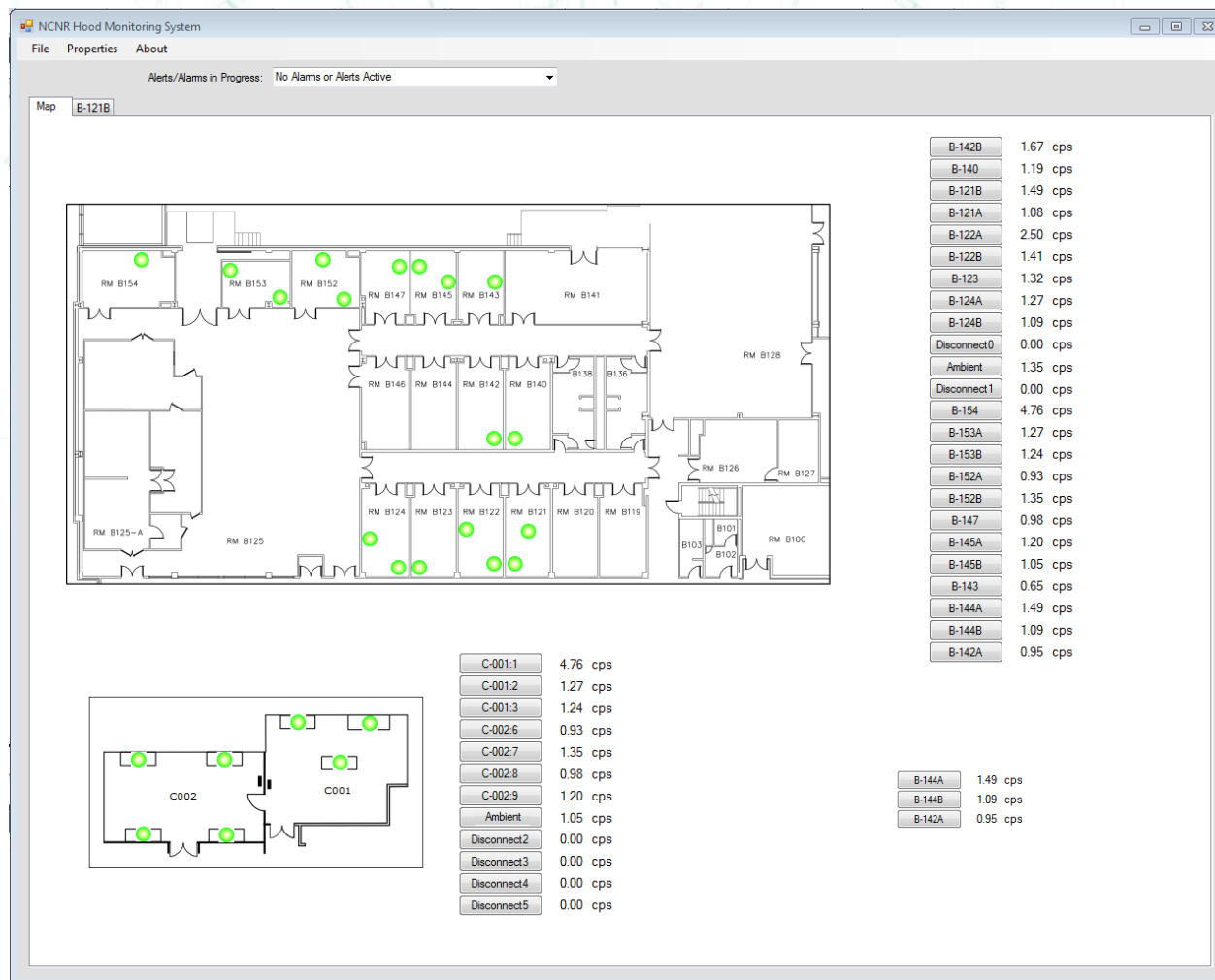
► Gradual Increase



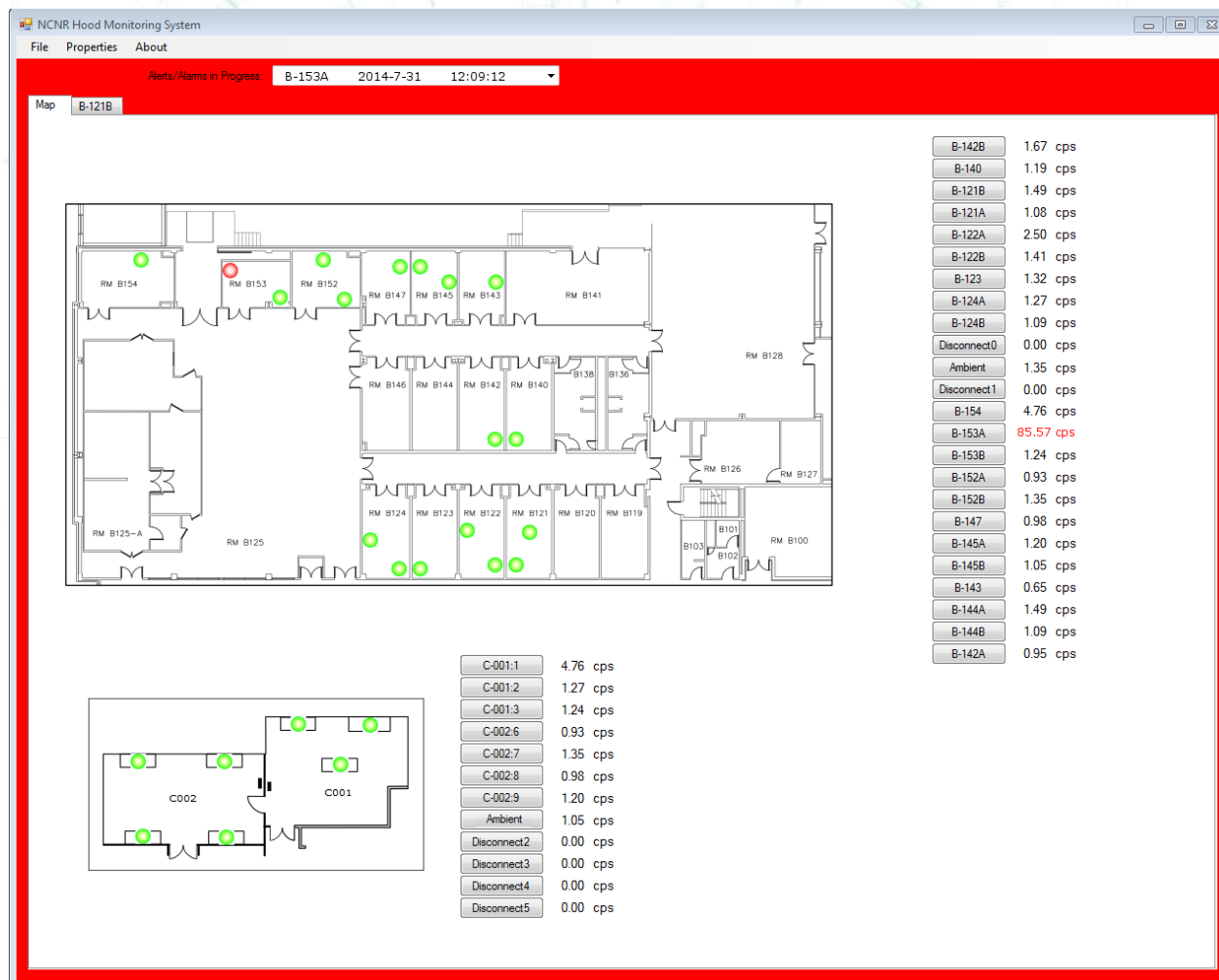
C#.NET Application

- ▶ Show:
 - Current values
 - Current alarms
- ▶ Display:
 - Data trends
 - Historical alarms
- ▶ Allow:
 - Graphical comparison
 - Data export as CSV, image

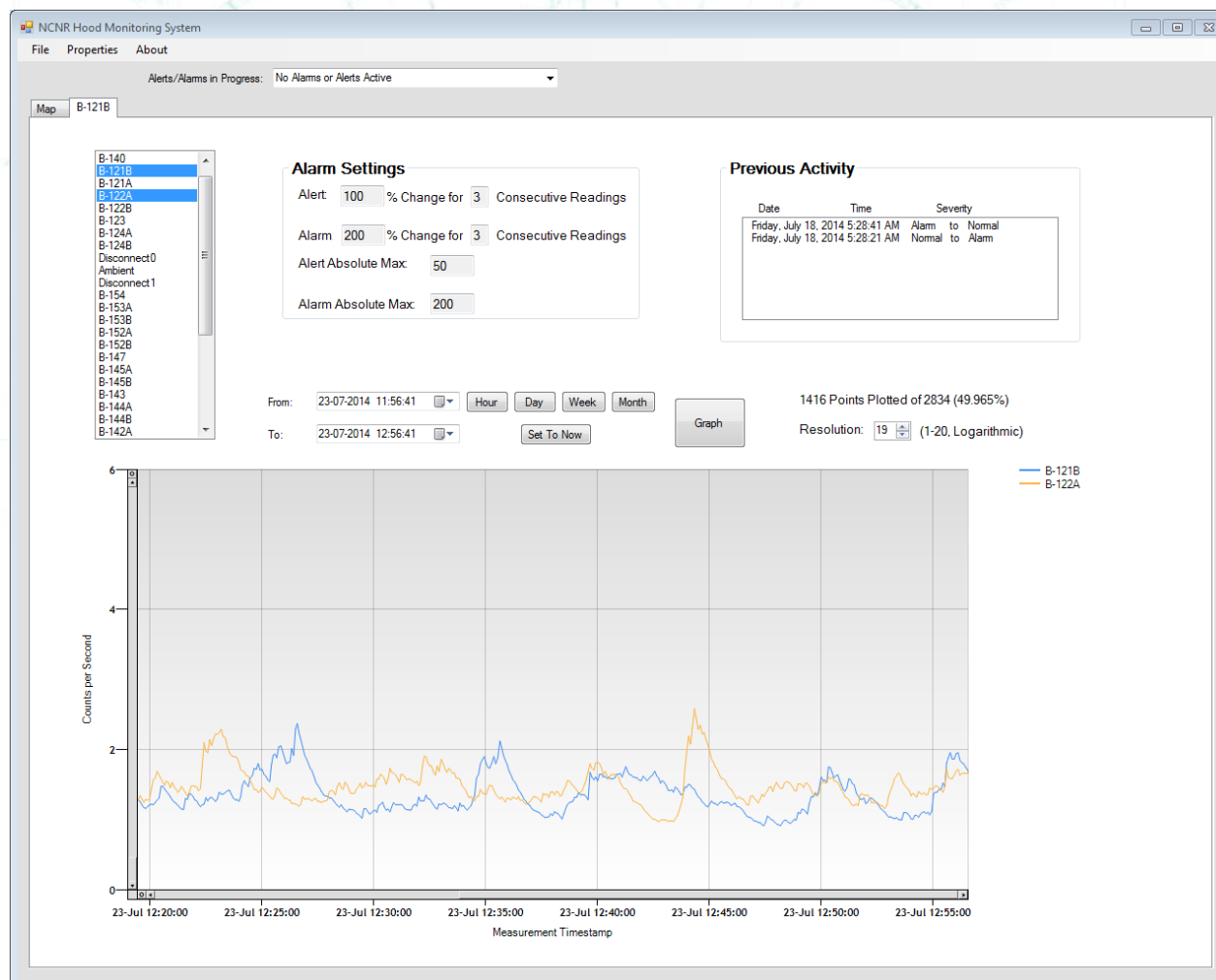
Map View



Map View



Graphing Functionality



Future Extensions

- ▶ Run python script as background process on VS
 - Automatic reboot
- ▶ Create interface for adjusting alarm settings
 - No manual manipulation of database
- ▶ Test
 - Accumulate Data
 - Determine alarm settings

Acknowledgements

- ▶ Joe Reyenga
- ▶ Tim Barvitskie
- ▶ Mike Middleton
- ▶ Mike Rowe
- ▶ Julie Borchert, Terrell Vanderah, & Bob Shull
- ▶ Robert Dimeo and NCNR Staff
- ▶ Alan Munter and Przemek Klosowski

